A HERPETOFAUNAL SURVEY OF THE MOJAVE DESERT OF EASTERN SAN BERNARDINO COUNTY, CALIFORNIA

by Timothy W. Brown, Ph.D.

The eastern Mojave Desert of San Bernardino County, California is a topographically diverse region which supports a rich and varied herpetofauna. The area included in this study is bounded on the north by Interstate Highway 15 and on the south by Route 66. A line from the town of Ludlow to Soda Dry Lake forms the western edge, while the Nevada state line is the boundary on the east.

Elevations within this area range from about 900 feet above sea level at Soda Dry Lake to over 6700 feet in the Granite Mountains. Even higher mountains lie just outside the northern boundary. Playas, sand dunes, bajadas, canyons, plateaus, and mesas make up the other physiographic features of the area. Virtually the entire region lies within the Lower Sonoran and Upper Sonoran Life Zones (Merriam, 1898). Only the Clark and Spring Mountains just north of this area reach the Transition and Canadian Life Zones.

In their 1948 survey of this region, Johnson, Bryant, and Miller list 28 species of reptile and one amphibian. On the basis of numerous visits and extensive study of this region since 1965, I now may definitely add the following species: western

blind snake (Leptotyphlops humilis), regal ringneck snake (Diadophis punctatus regalis), western leaf-nosed snake (Phyllorhynchus decurtatus perkinsi), desert glossy snake (Arizona elegans eburnata), Mojave shovel-nosed snake (Chionactis occipitalis occipitalis), Sonora lyre snake (Trimorphodon biscutatus lambda). The Utah black-headed snake (Tantilla planiceps utahensis) is a strong possibility, although unconfirmed by actual specimens. Likewise the banded Gila monster (Heloderma suspectum cinctum) is known from nearby southern Nevada and from two specimens actually collected in the area under consideration, but needs additional confirmation. A detailed discussion of this species is included as a separate section of this report.

In summary, this survey has added 8 snakes and one lizard to the list published by Johnson et al. (1948). This brings the number to 1 amphibian and 36 reptiles--1 tortoise, 16 lizards, and 19 snakes. Within their preferred habitats most of these species are widely distributed in the region. Therefore the emphasis in this report is on habitats rather than on specific localities. However, with rare or restricted forms, the localities of known populations as well as their habitats are given.

LIST OF AMPHIBIANS AND REPTILES OF THE EASTERN MOJAVE DESERT, THEIR HABITATS AND ABUNDANCE

Abundance	Habitat
A = abundant	PL = playas
C = common	SD = sand dunes
U = uncommon	WA = washes
O = occasional	SP = springs
R = rare	BJ = bajadas
	RK = rocks, canyons
	MS = plateaus, mesas

Common Name	Scientific Name	Habitat	Abundance
Amphibians			
Red-spotted Toad	(Bufo punctatus)	SP, WA	C-U
Reptiles			
1) Lizards			
Desert Banded Gecko	(Coleonyx variegatus variegatus)	PL,SD,WA, BJ	C
Desert Iguana	(Dipsosaurus dorsalis dorsalis)	PL,SD,WA, BJ	U-O
Western Chuckwalla	(Sauromalus obesus obesus)	RK	C-U
Zebra-tailed Lizard	(Callisaurus draconoides)	PL,SD,WA, BJ	A-C
Mojave Fringe-toed Lizard	(Uma scoparia)	SD	A-C
Collared Lizard	(Crotaphytus collaris)	RK	U-O

Common Name	Scientific Name	Habitat	Abundance
Long-nosed Leopard Lizard	(Crotaphytus wislizenii wislizenii)	PL,SD,WA,BJ	U-O
Yellow-backed Spiny Lizard	(Sceloporus magister uniformis)	BJ,RK,MS	U-O
Great Basin Fence Lizard	(Sceloporus occidentalis biseriatus)	RK,MS	C-U
Desert Side-blotched Lizard	(Uta stansburiana stejnegeri)	All habitats	A-C
Western Brush Lizard	(Urosaurus graciosus graciosus)	SD,WA	U-O
Southern Desert Horned Lizard	(Phrynosoma platyrhinos calidiarum)	PL,SD,WA,BJ	U-O
Desert Night Lizard	(Xantusia vigilis vigilis)	BJ,RK,MS	C-U
Western Red-tailed Skink	(Eumeces gilberti rubricaudatus)	WA,SP,RK	O-R
Great Basin Whiptail	(Cnemidophorus tigris tigris)	All habitats	C
Banded Gila Monster	(Heloderma suspectum cinctum)	WA,BJ,RK	?
2) Snakes			
Western Blind Snake	(Leptotyphlops humilis)	WA,BJ,RK	R
Desert Rosy Boa	(Lichanura trivirgata gracia)	RK	O-R
Regal Ringneck Snake	(Diadophis punctatus regalis)	RK,MS	R
Western Leaf-nosed Snake	(Phyllorhynchus decurtatus perkinsi)	WA,BJ	U
Coachwhip (Red Racer)	(Masticophis flagellum piceus)	All habitats	C-U
Desert Striped Whipsnake	(Masticophis taeniatus taeniatus)	RK,MS	U-O
Mojave Patch-nosed Snake	(Salvadora hexalepis mojavensis)	WA,BJ,MS	U-O
Desert Glossy Snake	(Arizona elegans eburnata)	PL,SD,WA, BJ,MS	C

Common Name	Scientific Name	Habitat	Abundance
Great Basin Gopher Snake	(Pituophis melanoleucus deserticola)	All habitats	C-U
California Kingsnake	(Lampropeltis getulus californiae)	WA,RK	O-R
Western Long-nosed Snake	(Rhinocheilus lecontei lecontei)	PL,WA,BJ, RK,MS	U-O
Western Ground Snake	(Sonora semiannulata)	BJ,RK	R
Mojave Shovel-nosed Snake	(Chionactis occipitalis occipitalis)	PL,SD,WA,BJ	C
Utah Black-headed Snake	(Tantilla planiceps utahensis)	SP,BJ,RK	?
Sonora Lyre Snake	(Trimorphodon biscutatus lambda)	RK	R
Desert Night Snake	(Hypsiglena torquata deserticola)	BJ,RK,MS	U
Southwestern Speckled Rattlesnake	(Crotalus mitchelli pyrrhus)	WA,RK	U-O
Mojave Desert Sidewinder	(Crotalus cerastes cerastes)	PL,SD,WA,BJ	C
Mojave Rattlesnake	(Crotalus scutulatus scutulatus)	WA,BJ,MS	C-U
3) Turtles			
Desert Tortoise	(Gopherus agassizi)	SD,WA,BJ	U-O

In summary, the above list includes 1 amphibian and 36 reptiles: 1 tortoise, 16 lizards, and 19 snakes.

DISTRIBUTION AND ABUNDANCE OF AMPHIBIANS AND REPTILES

I) Amphibians

1) Red-spotted toad (Bufo punctatus). This is the only amphibian known from the entire area. This species has a wide geographic range throughout the southwestern United States and occurs from below sea level to about 6500 feet. However, it is always found as isolated populations in the vicinity of springs, seeps, flooded mine tunnels, or other permanent water. Such populations may be small or large, depending upon the extent of suitable habitat. Although individuals may forage out for several hundred yards, especially on rainy nights, these toads are always concentrated in the vicinity of water and are absent from the dry area between.

II) Reptiles

A) Lizards

1) Desert Banded Gecko (Coleonyx variegatus variegatus). Banded geckos occur in virtually all habitats below 5000 feet but are far more common at the lower elevations. Washes, bajadas, vegetated sand dunes, and gentle rocky slopes are especially favored. These are nocturnal lizards. They spend the day under rocks or in burrows and are most frequently seen during warm weather after dark on paved desert roads.

2) Desert Iguana (Dipsosaurus dorsalis dorsalis). These lizards are locally uncommon to common on sandy or gravelly terrain below 3500 feet. They are most often encountered in the low valleys and bajadas, along washes, and on sand dunes,

especially where large creosote bushes provide shade and rodent burrows offer shelter. They are most active late in the morning during hot weather.

3) Western Chuckwalla (Sauromalus obesus obesus). Chuckwallas are strictly rock dwellers, being most partial to ledgy outcrops, boulders, and lava flows below 4500 feet. Occasionally, they may forage for blossoms out on open ground, but they never go very far from a rocky retreat to which they flee at the least sign of danger. These lizards bask conspicuously on the tops of rocks during warm weather in the morning and late afternoon. They seek shelter among rocks during the hottest hours of the day.

4) Zebra-tailed Lizard (Callisaurus draconoides). Zebra-tails are most abundant below 3500 feet where they occur on sand dunes, bajadas, washes, and on the low hot valley floors. Gravelly areas with creosote bushes, catclaws, and desert-willows (Chilopsis) seem most preferred. Between 3500 and 5000 feet these lizards become far less common and are generally restricted to sandy or gravelly washes. They are very conspicuous during warm weather. Juveniles may even be active on warm winter days.

5) Mojave Fringe-toed Lizard (Uma scoparia). This lizard is strictly specialized for living on fine windblown sand and occurs in no other habitat. In our area the fringe-toe is found only on the Devil's Playground--Kelso Dune sand sea below 2400 feet. Fringe-toed lizards are abundant wherever clumps of galleta grass (Hilaria) and creosote

bushes provide shade and shelter. However, they are considerably scarcer on open sandy stretches and virtually absent from the highest barren dunes. They are most active on hot mornings. A few juveniles may even be seen on warm winter days.

6) Collared Lizard (Crotaphytus collaris). This big-headed boldly marked lizard is most often seen conspicuously atop some boulder where it can be rather closely approached before taking flight. This species feeds to a considerable extent upon smaller reptiles such as the side-blotched lizard. Collared lizards occur from the lowest elevations to about 5700 feet, but always among large rocks. They are found most often at the middle elevations, but are generally uncommon wherever they occur.

7) Long-nosed Leopard Lizard (Crotaphytus wislizenii wislizenii). Like collared lizards, leopard lizards feed on other reptiles, but they are rarely found among rocks. These lizards occur from playa margins and sand dunes in the low valleys to the mesas at 5500 feet and also inhabit bajadas and washes. They are especially partial to sandy or gravelly terrain with scattered clumps of vegetation. Leopard lizards occur over wide areas of suitable habitat, but are not especially common anywhere.

8) Yellow-backed Spiny Lizard (Sceloporus magister uniformis). Although they are found over a wide range of elevations up to 5300 feet, spiny lizards are most numerous on the bajadas and rocky areas between 3000 and 5000 feet. Two situations are especially favorable for them. The first is among yuccas

and Joshua trees, where spiny lizards climb the trunks of these plants or seek refuge under fallen debris. The second is among boulders where they can be seen basking in the same manner as chuckwallas and collared lizards. At higher elevations, spiny lizards favor the warmer south-facing slopes, whereas Great Basin fence lizards will inhabit the cooler north-facing ones--even in the same wash or canyon.

9) Great Basin Fence Lizard (Sceloporus occidentalis biseriatus). Although widespread elsewhere, in the eastern Mojave, this lizard is a true postpluvial relict of the Great Basin Desert. Here this species only occurs above 4500 feet in the Granite, Providence, and New York mountain ranges as well as on the Mid-Hills plateau. It is especially common in rocky areas around pinyons and junipers. This is the only lizard frequently seen in the higher canyons such as Carruthers and Keystone where scrub oaks (Quercus) and silk-tassel bushes (Garrya) form a chaparral-like vegetation.

10) Desert Side-blotched Lizard (Uta stansburiana stejnegeri). This is undoubtedly the most widespread and abundant reptile in the eastern Mojave Desert. It ranges from the lowest basins up to about 5500 feet. At higher elevations it prefers warm slopes and open sunny areas. At lower elevations it occurs in every habitat where it is usually the commonest lizard. Except on the Devil's Playground sand sea where fringe-toed lizards far outnumber all other kinds, the side-blotched lizard is sure to be seen, even when no other reptiles are evident. This species is active nearly all year, except on cold overcast winter days.

11) Western Brush Lizard (Urosaurus graciosus graciosus). This small slender lizard inhabits the low hot basins such as the Devil's Playground, and the Clipper, Fenner, and Piute Valleys below 2500 feet. It is moderately common along washes where it lives among the branches of mesquites, catclaws, and smoke trees (Dalea). The brush lizard also occurs less commonly away from washes in creosote bushes, especially on the Devil's Playground.

12) Southern Desert Horned Lizard (Phrynosoma platyrhinos calidiarum). Horned lizards inhabit sandy and gravelly areas below 5000 feet. Bajadas, alluvial fans, and washes seem especially preferred, although they also occur on sand dunes and rarely among rocks. On warm spring days, fair numbers of them may be seen about. However, at other times they are only occasionally encountered. Ants appear to be the favorite food of horned lizards.

13) Desert Night Lizard (Xantusia vigilis vigilis). These small lizards are most numerous at the middle elevations between 3000 and 5500 feet. Although not rare, they are seldom seen because of their small size and secretive habits. Night lizards spend most of their time under the fallen trunks of Mojave yuccas and Joshua trees where they feed on small insects. During hot dry weather, they take refuge in underground burrows beneath piles of debris. They sometimes forage on the surface at night or after rains. Bajadas covered with yuccas and Joshua trees are the favorite habitat, but night lizards also occur less commonly among pinyons and junipers in rocky areas.

14) Western Red-tailed Skink (Eumeces gilberti rubricaudatus). In the eastern Mojave Desert, the red-tailed skink is rather spottily distributed at elevations above 3800 feet, nearly always among rocks in the vicinity of water. Dense thickets of catclaw, seep-willow (Baccharis), and grasses around springs are the favorite habitat. These lizards also sometimes live among yuccas, and catclaws, or at higher elevations, pinyons and scrub oaks along rocky canyon walls. Skinks are secretive, spending much of their time beneath bark, rock slabs, or other debris.

15) Great Basin Whiptail (Cnemidophorus tigris tigris). The whiptail is a common and conspicuous lizard of many habitats below 5500 feet. Open sandy or gravelly washes and bajadas with a scattering of shrubs seem most preferred, although vegetated sand dunes, the edges of playas, and rocky slopes are also suitable. Whiptails are most active on warm mornings and are usually seen foraging about for insects around the bases of small shrubs.

16) Banded Gila Monster (Heloderma suspectum cinctum). The Gila Monster is essentially a Sonoran Desert reptile whose presence in the eastern Mojave Desert of California requires further confirmation. A full discussion of this species is presented elsewhere in this report.

B) Snakes

1) Western Blind Snake (Leptotyphlops humilis). This small secretive snake seems rare since it is seldom seen. It spends virtually all of its time burrowing. Very rarely, a blind snake may be found on the surface at night. It is

likely that small populations concentrate under bushes or dead wood where termites and ant larvae provide the principal source of food. This species occurs on bajadas, along washes, and on rocky slopes from 2500 to 4500 feet.

2) Desert Rosy Boa (Lichanura trivirgata gracia). Rocky terrain below 4500 feet including hillsides, washes, and canyons are the preferred habitat of the rosy boa. During hot weather, these snakes are nocturnal, but in spring they are sometimes found out during the day. These little constrictors feed mainly on small mammals and are heavily collected for pets because of their docile dispositions. They are uncommon in the eastern Mojave Desert.

3) Regal Ringneck Snake (Diadophis punctatus regalis). In our area the ringneck snake is only known from an isolated relict population in the Providence Mountains above 5000 feet in pinyon-juniper woodland. Very few specimens of this secretive snake have been taken here, most of them having been collected near Mitchell's Caverns (T-10N, R-14E, S-21) at about 4500 feet. These were found under bark slabs on dead pinyon logs by Mr. Herbert Pierce, then ranger at Mitchell's Caverns State Park. Regal ringneck snakes are fairly common on the mountains and plateaus of Arizona and New Mexico, but are absent from the low hot deserts to the west. This snake likely occurs in the higher canyons of the New York Mountains as well, although, no specimens are yet available from there. Ringnecks prefer moist shaded habitats and feed on small vertebrates and invertebrates.

4) Western Leaf-nosed Snake (Phyllorhynchus decurtatus perkinsi). Leaf-nosed snakes are small nocturnal burrowing snakes, seen most often crossing paved roads on warm nights. They occur below 3000 feet and prefer bajadas with stony or gravelly soils. Creosote bush, bur sage, and catclaw are the dominant plants in this habitat. Leaf-nosed snakes are not rare, but are almost never encountered except at night where several may occasionally be found along a mile of paved road.

5) Coachwhip or Red Racer (Masticophis flagellum piceus). Coachwhips are fast, active, diurnal snakes which often reach five feet or more in length. They can occur in most habitats below 5500 feet, but seem to prefer washes and bajadas where there is fairly open ground. They are generally uncommon, but because they are large and conspicuous, they appear to be more numerous than they actually are. Coachwhips feed on a variety of other vertebrates including snakes.

6) Desert Striped Whipsnake (Masticophis taeniatus taeniatus). In our area this species is a true postpluvial relict, being found only above 4500 feet in the Providence and New York Mountains as well as the Mid-Hills plateau. The striped whipsnake is rather common to the north in the Great Basin Desert, where the coachwhip is absent. Likewise in the Providence and New York Mountains, the striped whipsnake appears to replace the coachwhip at higher elevations. The two species overlap somewhat on the Mid-Hills plateau. Here the striped whipsnake is usually found in denser brush or among rocks, whereas the coachwhip prefers open sparsely

vegetated areas. The desert striped whipsnake has not been recorded from the adjacent Granite Mountains to the southwest, although these mountains reach an elevation of over 6700 feet.

7) Mojave Patch-nosed Snake (Salvadora hexalepis mojavensis). This slender racerlike snake is strictly diurnal and found over a wide range of habitats up to about 5500 feet. It does not inhabit the Devil's Playground sand sea but prefers bajadas, washes, mesas, and even rocky slopes. Patch-nosed snakes occur in a variety of plant communities including creosote bush scrub, Joshua tree woodland, sagebrush scrub, and pinyon-juniper woodland. Despite their wide occurrence, patch-nosed snakes are not especially common. They are most frequently seen on warm spring mornings.

8) Desert Glossy Snake (Arizona elegans eburnata). Although the glossy snake may be found up to elevations of 5200 feet, it is most common at lower elevations. This snake is frequently seen on paved roads after dark, often in fair numbers, and sometimes on rather chilly evenings. A variety of habitats are suitable, including sand dunes, washes, bajadas, playa margins, and to a lesser extent, rocky slopes. Areas of sandy or gravelly soil seem generally preferred. These common snakes feed on lizards and small rodents which they kill by constriction.

9) Great Basin Gopher Snake (Pituophis melanoleucus deserticola). Sometimes known as the "bull snake" or "blow snake", this robust constrictor reaches a length of over five feet and

is familiar to most people living in the desert. Gopher snakes are fairly common and occur over a greater range of elevations and habitats than any other snake of our area. They may be found from the lowest hottest desert basins up to 6000 feet. These snakes can be active at any time of day, but become largely nocturnal during the hottest months. Playa margins, sand dunes, washes, bajadas, rocky areas, plateaus, and canyons all provide suitable habitat for gopher snakes. They are especially attracted to old abandoned buildings and dumps where they feed on rodents.

10) California Kingsnake (Lampropeltis getulus californiae). The kingsnake is uncommon to rare in the eastern Mojave Desert. It is found at middle elevations between 2500 and 5500 feet, generally in washes or rocky areas with a cover of fairly dense brush or low trees. During cooler weather kingsnakes may be active during the day, but in summer they are mostly nocturnal. This species feeds on a variety of vertebrates including other snakes, killing prey by constriction.

11) Western Long-nosed Snake (Rhinocheilus lecontei lecontei). This somewhat smaller relative of the kingsnake is strictly nocturnal spending much of its time in burrows and under cover. The long-nosed snake is seldom seen except on paved roads on warm nights. This is another widespread but uncommon species found along dunes, playa margins, bajadas, washes, rocky hillsides, and plateaus up to about 5500 feet. Small vertebrates and reptile eggs form the diet of the long-nosed snake.

12) Western Ground Snake (Sonora semiannulata). The few recorded specimens of this small rare snake from the eastern Mojave Desert have all come from brushy rocky slopes between 4000 and 5000 feet in elevation. In other parts of the southwest where this species is more common, it occurs in a variety of habitats including sand dunes, creosote bush scrub, washes, and river flood plains. Additional specimens would help to clarify the habitat preferences of the ground snake in our area. This secretive burrower feeds mainly on small arthropods.

13) Mojave Shovel-nosed Snake (Chionactis occipitalis occipitalis). Common below 4000 feet, the shovel-nosed snake prefers loose sand or gravel in which it spends most of its time burrowing. Sand dunes, playa margins, bajadas, and washes are all suitable habitats. Shovel-nosed snakes even occur among rocks, provided there is some sand or gravel. Creosote bushes, catclaw, smoke trees, and bur sage are the most common plants where shovel-nosed snakes are found. These snakes are mainly nocturnal and can sometimes be found in some numbers on paved roads after dark. Occasionally in spring they are active on the surface during the day. Small arthropods are the food of this species.

14) Utah Black-headed Snake (Tantilla planiceps utahensis). This tiny secretive snake has not been recorded from the area under consideration, but is a likely addition, and so has been included. Small isolated populations occur to the north and east in the Kingston and Charleston Mountains, at elevations of 3000 to 5500 feet. Rocky bajadas, hillsides, and canyons, especially near springs, seem to be most likely habitats.

15) Sonora Lyre Snake (Trimorphodon biscutatus lambda). This is a snake of rocky areas where it hides in crevices during the day and forages about at night. Lava flows, bajadas, rocky washes, cliffs, ledges, and canyons all provide suitable habitat. Although lyre snakes can occur at any elevation up to 5500 feet, they are rather scarce in our area. Occasionally one is encountered after dark on a paved road through rocky terrain. Lyre snakes feed on lizards and small mammals which they subdue with a mild venom. They are not considered dangerous to man.

16) Desert Night Snake (Hypsiglena torquata deserticola). Night snakes are small secretive reptiles, occasionally seen on paved roads after dark. Although they are found from the lower slopes of bajadas to nearly 6000 feet, they are most common between 3000 and 5500 feet in dense stands of Mojave yuccas and Joshua trees. Here night snakes hide under fallen trunks and feed on small lizards. Loose bark slabs and rock crevices provide shelter in habitats where large yuccas are not present.

17) Southwestern Speckled Rattlesnake (Crotalus mitchelli pyrrhus). This large, heavy-bodied rattlesnake reaches a length of four feet and is almost always found among rocks. Speckled rattlesnakes can occur at any elevation, but are most common between 2000 and 5500 feet. Bouldery hillsides, talus slopes, and ledgy canyons seem especially favorable for these snakes. They may be encountered at any time of day, but are generally nocturnal in hot weather, especially at lower elevations. Caves and abandoned mine tunnels are frequently used as

refuges from the daytime heat. Occasional individuals may wander down washes, but rarely go very far from some rocky retreat. Speckled rattlesnakes are fairly common in most rocky areas and essentially absent from all other habitats.

18) Mojave Desert Sidewinder (Crotalus cerastes cerastes). Sidewinders are among the most common of snakes in the low basins of the Mojave Desert. Any sandy or gravelly terrain below 4000 feet is suitable. Bajadas, washes, dunes, and playa margins with scattered creosote bushes, bur sage, catclaw, and galleta grass clumps provide favorable habitat. Sidewinders are especially common on the vegetated portions of the Devil's Playground sand sea where Brown (1970) estimates a population density of 1 sidewinder every 2-3 acres. During the spring and fall, sidewinders are occasionally found coiled under bushes during the day. However, in the heat of summer, they are nocturnal and spend the daytime in small mammal burrows. They are most often seen on paved roads at night. Small mammals and lizards are their food.

19) Mojave Rattlesnake (Crotalus scutulatus scutulatus). Gentle slopes and plateaus between 2500 and 5500 feet with a fairly dense cover of shrubs provide the ideal habitat for Mojave rattlesnakes in our area. They are most common on bajadas among Mojave yuccas, Joshua trees, creosote bushes, and catclaws. They also occur in sagebrush and rabbitbush above 5000 feet. They are essentially absent from the lowest valleys, sand dunes, and rugged rocky terrain. These boldly-marked greenish rattlesnakes reach a length of about 3 feet and feed on rodents and lizards. Like other rattlesnakes, they

are mostly nocturnal during the summer months, when they are frequently seen on paved roads after dark. While not especially aggressive, the Mojave rattlesnake has the most toxic venom of any rattlesnake. Any bite should receive expert medical attention without delay.

C) Turtles

1) Desert Tortoise (Gopherus agassizi). Desert tortoises may be found in many habitats from the lowest valley floors to about 5300 feet in the Cedar Canyon and Gold Valley regions. However, they are uncommon above 5000 feet. Vegetated sand dunes, washes, and even rocky hillsides are inhabited. Bajadas between 2100 and 5000 feet are optimum habitat, and here tortoises often may be seen crossing roads or browsing on vegetation on warm spring days. Tortoises dig slanting burrows as long as 30 feet into embankments or under the bases of shrubs. Here they retire at night and on very hot or cold days, several often occupying the same burrow. Because they are easily captured and make appealing pets, desert tortoise populations may have declined in some areas, especially near well-travelled roads.

DISTRIBUTION OF SPECIES BY HABITAT

1) Playas

Three playas occur in the area under consideration: Soda Dry Lake, which is contiguous with the Devil's Playground sand sea, lies in the northwest corner; Broadwell Dry Lake, in a small valley between the Bristol and Cady Mountains, is on the southwest edge; and Ivanpah Dry Lake is in the extreme northern corner. The barren alkali flats themselves are devoid of all reptiles or amphibians. However, the silty hummocks topped with saltbush (Atriplex), inkweed (Suaeda), and creosote bush (Larrea) which surround playas support a variety of reptiles. Most common here are zebra-tailed lizards, Great Basin whiptails, and desert side-blotched lizards. At night desert banded geckos become active. Somewhat less common are desert horned lizards and desert iguanas. The long-nosed leopard lizard--a lizard eater--is at home here but is not especially numerous. The Mojave fringe-toed lizard is common around Soda Dry Lake, but is absent from the edges of Broadwell and Ivanpah Dry Lakes.

During warmer weather, most snakes are active at night. The following kinds are frequently found among the shrubs at the edges of the playa: western leaf-nosed snakes, desert glossy snakes, Mojave shovel-nosed snakes, and Mojave Desert sidewinders. Great Basin gopher snakes and western long-nosed snakes occur somewhat less frequently. The coachwhip or red racer is fairly common here and always active during the day. Occasionally a desert tortoise may wander into this area, but the habitat is very marginal for them. No amphibians are found here.

2) Sand Dunes

This habitat is extensively represented in our area by the well-known Kelso Dunes-Devil's Playground sand sea. By far the most abundant reptiles here are Mojave fringe-toed lizards, which comprise over 80% of the individual lizards on the dunes (Brown, 1970). These are highly specialized for living on wind-blown sand and are never found in any other habitat. Lesser numbers of lizards belonging to other species are found here as well. Great Basin whiptails and desert side-blotched lizards are common, while desert iguanas and western brush lizards are only slightly less so. Also found in this habitat are zebra-tailed lizards, southern desert horned lizards, desert banded geckos, and long-nosed leopard lizards, especially among shrubs in the shallow washes. In sandy areas sidewinders, shovel-nosed snakes, glossy snakes and an occasional gopher snake comprise a rather meager list of snakes. However, the first three species are usually quite common. While not as numerous as elsewhere, desert tortoises also inhabit sandy terrain especially along washes. No amphibians are found here.

3) Washes

A wash at any elevation concentrates whatever precipitation falls within its watershed. Consequently denser vegetation usually occurs along washes than on the surrounding terrain. This, plus undercut embankments and a variety of substrates ranging from boulders to sand, provide abundant shade and hiding places for reptiles. Washes also cut across other habitats affording a means of dispersal through them. As a result, desert amphibians

and reptiles along washes often greatly exceed, in numbers and variety, those in other habitats.

The herpetofauna of any particular wash depends upon its elevation and the nature of the adjacent habitats. Within these limits, nearly any species may be found in washes at some time or other. However, certain ones are typical inhabitants, and so are included in the following list:

A) Below 5000 Feet

The commonest species are zebra-tailed lizards, whiptail lizards, side-blotched lizards, desert horned lizards, leopard lizards, and banded geckos. Any Gila monsters would be most likely in this habitat. Desert iguanas and western brush lizards occur at the lowest elevations. Wherever windblown sand forms drifts, fringe-toed lizards may be common, but only in washes adjoining the Kelso-Dunes--Devil's Playground sand sea. Blind snakes, glossy snakes, gopher snakes, kingsnakes, shovel-nosed snakes, and sidewinders all seem partial to washes at lower elevations. Desert tortoises frequently dig their burrows into wash embankments.

B) Above 5000 Feet

Whiptails and side-blotched lizards are still the most common and conspicuous species. Because washes at higher elevations often usually cut through rocky terrain, a number of rock-inhabiting forms also live along them. Among these are collared lizards, yellow-backed spiny lizards and Great Basin fence lizards. Gopher snakes, kingsnakes, and speckled rattlesnakes frequent washes as do desert striped whipsnakes in the Providence and New York Mountains.

4) Seeps and Springs

Except for cattle tanks and occasional rock tinajas, natural seeps and springs comprise the only source of free water in this entire desert region. A number of these dot the area, especially at the bases of mountains and in places where washes have intersected the water table. Many are virtually dry much of the time, but a number have some water nearly year-round. Vegetation such as coyote brush (Baccharis), honey mesquite (Prosopis), and catclaw (Acacia) usually provides dense cover with the moisture.

The only amphibian in the entire area, the red-spotted toad, is restricted to the immediate vicinity of seeps and springs at nearly all elevations. Although this toad has a wide geographic range, the actual populations are concentrated around water sources with none in the areas between. At night, especially during rains, red-spotted toads may forage several hundred yards from their home spring, but never much further. Desert reptiles, being better drought-adapted, are not especially tied to permanent water. Nevertheless, a number of kinds may secondarily concentrate here because of the cover and relative abundance of food. Only the western red-tailed skink definitely seems to prefer the dense clumps of vegetation around springs over other habitats.

5) Bajadas and Alluvial Slopes

Because the erosional debris from mountains has filled the basins and extends far upslope to form bajadas, this is probably the most extensive habitat in the region. Below 3500 feet the vegetation is dominated by creosote bush (Larrea) and bur sage (Ambrosia), while from 3500 to about 5000 feet, Mojave yucca

and Joshua tree (Yucca), chollas (Opuntia), and a variety of sclerophyllous shrubs make their appearance.

The most abundant lizards here are side-blotched lizards, whiptails, and spiny lizards, which occur almost everywhere. Although common, the desert night lizard is seldom seen, since it spends most of its time hiding under fallen yucca branches. Less numerous, though widespread, are leopard lizards and desert horned lizards. Gila monsters might be expected in this habitat as well. Banded geckos are quite common, especially at the lower elevations.

A number of snakes inhabit the bajadas. Of these, coachwhips and patch-nosed snakes are conspicuous and active during the day. Gopher snakes, glossy snakes, and long-nosed snakes, and Mojave rattlesnakes are also fairly common. Night snakes are secretive, being found mainly under fallen yuccas where they prey on small lizards. Blind snakes are also found here, but are seldom seen because of their secretive burrowing habits. Sidewinders occur on bajadas at lower elevations, rarely above 3800 feet, and then usually along sandy washes. Vegetated alluvial slopes provide ideal environment for desert tortoises which reach their highest population densities in this habitat.

6) Rocky Habitat

Rocky terrain may be found at all elevations in the eastern Mojave Desert, and it is the predominant habitat above 5000 feet. The vegetation varies considerably with elevation, degree of slope, slope direction, and to a lesser extent, with rock type. This habitat includes ledgy cliffs, boulder-studded slopes, steep canyons, lava flows, and rocky washes.

A) Below 5000 feet

Here creosote bushes, various cacti (Opuntia, Ferocactus), yuccas, and catclaw grow among the rocks, occasionally forming a rather dense cover. Side-blotched lizards abound. Also common and conspicuous in many places are collared lizards, chuckwallas, and spiny lizards. Whiptails may be found foraging about between the rocks. Night lizards and red-tailed skinks occur here beneath the densest vegetation--especially near springs in the case of the skink. Gila monsters also inhabit rocky terrain.

Blind snakes and rosy boas are partial to this habitat, although they are seldom seen. Coachwhips, patch-nosed snakes, glossy snakes, gopher snakes, long-nosed snakes, and night snakes can also occur among rocks, although they are probably somewhat more common in other habitats. In the eastern Mojave Desert, kingsnakes and ground snakes are rather rare but turn up most often in rocky areas. Lyre snakes and speckled rattlesnakes are almost never found in any other habitat, fairly common in the area. Desert tortoises occasionally turn up among rocks, although they are more common elsewhere.

B) Above 5000 feet

At the higher elevations, Upper Sonoran Life Zone vegetation predominates. Pinyons (Pinus), junipers (Juniperus), rabbitbrush (Chrysothamnus), scrub oak (Quercus), and silk-tassel bush (Garrya) often form a shrubland or woodland. On the warmer south-facing slopes, reptiles common at lower elevations may straggle up to 5500 feet or more. However, these are largely replaced by a few cooler climate forms which

characterize the higher elevations. Collared lizards, spiny lizards, and whiptails occur on the warmer slopes as do side-blotched lizards. However, the Great Basin fence lizard is by far the predominant species at these higher elevations, being found almost everywhere right up to the tops of the highest peaks.

A similar situation occurs with the snakes. Gopher snakes and speckled rattlesnakes share the higher elevations with desert striped whipsnakes and regal ringneck snakes--especially in the Providence and New York Mountain ranges.

7) Plateaus and Mesas

Below 5000 feet the plants and animals of these level places differ little from those of bajadas and rocky areas of similar elevation. However, in the Providence and New York Mountains, and especially in the Mid Hills--a plateau lying between these two ranges--a rather unique community exists above 5000 feet. Here the flat to rolling terrain is covered with big sagebrush (Artemisia), bitterbrush (Purshia), blackbrush (Coleogyne), and rabbitbrush (Chrysothamnus). Open stands of pinyon, juniper and Joshua trees dot the area. Except for the Joshua trees, this landscape strongly resembles the Great Basin Desert to the north. Many of the plants and animals are, in fact, Great Basin relicts of the pluvial period, 8000 to 10,000 years ago (Antevs, 1952).

Two reptiles only occur in this habitat and, to a lesser extent, on the adjacent rocky slopes. These are the desert striped whipsnake and the regal ringneck snake. The whipsnake is uncommon and the ringneck is quite rare, spending most of its time

under flat stones or loose bark. An assortment of other reptiles range up from the bajadas to their attitudinal limits on these elevated flatlands. These include geckos, zebra-tailed lizards, leopard lizards, spiny lizards, side-blotched lizards, desert horned lizards, desert night lizards, and whiptails. However, the Great Basin fence lizard is usually the most common reptile in this habitat.

Of the snakes, the gopher snake is commonest here. Coachwhips and patch-nosed snakes occur, especially in open brushlands or overgrazed areas. Occasional Mojave rattlesnakes turn up in the sagebrush, but they are not nearly as common at these elevations as on the bajadas lower down.

ENDANGERED HABITATS IN THE EASTERN MOJAVE DESERT

Habitat destruction is tantamount to destroying the amphibians and reptiles which live there. Unless a species is widespread or highly adaptable to rapid change, it declines and eventually disappears from the affected area. Virtually all of the short-term habitat destruction in the desert nowadays is due to man and/or introduced animals. Although this impact is evident to some degree over nearly all of the eastern Mojave Desert, certain situations are very serious and require immediate and careful management, if the plant and animal communities are to remain at all intact.

1) Springs and Water Holes

In the desert, water is life itself. Any permanent surface water source produces lush thickets of vegetation. The water, cover, and food there attracts a variety of insects, birds, and small mammals, which in turn serve as prey for amphibians and reptiles. Red-spotted toads, the only amphibians in our area, concentrate at these scattered water sources and are seldom found in any other habitat. They require open water for breeding and must burrow into damp soil, since they rapidly lose moisture through their permeable skins. Insects, which abound near water, are the prey of these toads.

Reptiles are far less dependent upon free water than amphibians. They do, however, concentrate near water where cover and food are available. Western red-tailed skinks seem especially drawn to such situations, particularly in rocky areas. The dense vegetation and

cooler temperatures seem especially important to skinks, and they occur almost nowhere else in the desert. Side-blotched lizards, spiny lizards, fence lizards, leopard lizards, collared lizards, whiptails, chuckwallas, gopher snakes, king snakes, striped racers, rosy boas, and speckled rattlesnakes also seem to be found in somewhat greater numbers in the vicinity of springs; although they are by no means restricted to this habitat.

Human influences around water sources have both helped and hurt the eastern Mojave Desert herpetofauna. Where men have come and gone leaving behind enlarged water holes, or overflowing concrete tanks kept filled by dripping water pipes, desert amphibians and reptiles have flourished. This is especially true of places where thickets of trees and shrubs have remained or regrown. Unfortunately cattle and wild burros often negate these man-made improvements. Overgrazing, trampling of vegetation, and fouling of the water itself are serious problems in many places. Too many cattle or burros can turn these lush oases into foul quagmires of mud and feces where nothing flourishes except flies.

Ideally, all natural springs accessible to cattle and wild burros should be fenced to allow unpolluted water and intact vegetation to support the natural community of desert animals. Narrow baffle gates in these fences would permit human entry. Openings left in these fences in places too precipitous for burros or cattle would give bighorn sheep access to water while excluding their destructive competitors. Concrete tanks built outside of cattle fences and fed by water pipes from the springs could serve the needs of domestic livestock. The barren trampled

earth surrounding these would support no amphibians or reptiles, but the fenced springs, at least, would provide adequate refuges.

Damage by thoughtless or malicious humans is also a factor. Mesquite and other trees which group near springs are frequently cut for campfires. Because springs are especially attractive as campsites, fire damage, trash, run-over vegetation, and even human excrement have become all too prevalent. Vandalism such as shooting, defacement of rocks, and even intentional fouling of springs themselves are also of common occurrence. Much of this kind of impact offends human aesthetic sensibilities more than it harms wildlife. However, fouling of springs and damaging the vegetation actually does degrade the wildlife habitat. Then, too, the continual presence of human activities with the inevitable harrassment, capture, and killing of wild animals by thoughtless persons rapidly depopulates such areas of their more conspicuous fauna. If camping is to be permitted, designated campsites should be built away from the springs themselves. Therefore, if the natural beauty and habitat value of desert springs are to be maintained, these very limited and extremely vulnerable environments must receive a high management priority with a maximum of supervision, law enforcement, and impact control.

2) Washes

Some of the larger washes collect the runoff from hundreds of square miles of desert. This manyfold concentration of water in channels produces narrow belts of lush vegetation which often extend across miles of otherwise nearly barren terrain. Needless

to say, a great variety of reptiles, birds, and mammals is concentrated along washes with the abundance of food and shelter to be found there (see p.). Even red-spotted toads may be found in washes some distance from springs. Banded geckos, desert iguanas, side-blotched lizards, zebra-tailed lizards, fringe-toed lizards, leopard lizards, brush lizards, horned lizards, and whiptails are partial to washes as are coachwhips, glossy snakes, gopher snakes, king snakes, long-nosed snakes, shovel-nosed snakes, sidewinders, and desert tortoises. Many animals travel along washes, because they usually provide easier going through rough country.

It is for this reason that washes are extremely vulnerable to damage by humans. Back country roads frequently follow washes, and with the advent of off-road vehicles, they have become veritable highways. It is rare to find even a small wash nowadays which is not criss-crossed by tire tracks. While flash floods may violently scour desert washes, they are sufficiently infrequent to permit recovery of the plant and animal community. Then, too, organisms along washes are adapted to flash floods. The benefits of extra water and organic matter are necessary to sustain this habitat.

The constant impact of off-road vehicles through the very heart of such concentrated biological communities confers no benefits whatever and does result in a great deal of destruction. Shallow root systems are destroyed, and small plants are crushed and broken. The loss of cover makes the environment less suitable for many reptiles. Small animals are repeatedly frightened or actually run over--especially shallow burrowers such as zebra-tailed lizards, fringe-toed lizards, horned lizards, and shovel-nosed snakes. It is urged that access to off-road vehicle areas

be by designated roads which avoid washes wherever possible. Washes should be strictly off-limits to such use. Needless to say, any diversion of washes into concrete channels completely destroys the biological communities along those stretches.

3) Sand Dunes

Prior to the advent of off-road vehicles, sand dunes were considered impassible except on foot, and therefore were subject to little human impact. Now this habitat is one of the most heavily-used in the entire desert. The highest barren dunes, devoid of vegetation, where sand is constantly being shifted by the wind support almost no reptile life. Portions of these may be designated for recreation without undue disturbance to biotic communities. However some of these dunes certainly should be left undisturbed for their aesthetic and scientific value. Crowds of people and machines with their accompanying noise and litter make it difficult even to enjoy adjacent areas from which they are excluded.

However invulnerable barren dunes may be, as soon as they are colonized by stabilizing plants such as mesquites, desert willows, galleta grass, and creosote bushes, a unique and delicate reptile community becomes established among them. Many of these reptiles are specialists, some of which are found in no other habitat. Foremost among these is the Mojave fringe-toed lizard. In addition to many other anatomical and behavioral adaptations for sand-dwelling, these lizards commonly bury themselves just under the sand surface. This is often done at a dead run when a fringe-toed

lizard is pursued and dives out of sight down into the sand. Such behavior, while successful against animal predators, is usually fatal against dune buggies or dirt bikes which simply crush the hapless lizard as it lies under the sand. A number of other sand-dwellers such as side-blotched lizards, zebra-tailed lizards, horned lizards, and shovel-nosed snakes are equally vulnerable as they rest under a superficial layer of sand. Whiptail lizards, desert iguanas, gechos, and most snakes do not actually bury themselves, but retreat to burrows. Even these tunnels are easily caved in by the weight of vehicles on the sand above. Sidewinders frequently lie in shallow craters on the surface and are run over, as are slow-moving desert tortoises when they walk about. Even more serious is the carnage wrought at night. Summer days are uncomfortably hot, so O.R.V. (Off-Road Vehicle) enthusiasts take to the dunes at night. This is precisely the time when many desert reptiles, especially snakes, become active. During the day, they hide under the larger clumps of vegetation which are usually avoided by O.R.V.'s, but at night these hapless creatures become totally vulnerable as they wander about out in the open.

Reptile life is also destroyed indirectly by the damage to dune vegetation. As O.R.V.'s swerve around large plants such as creosote bushes, they cut and tear the lateral roots which lie just under the sand surface. Chronic damage of this sort causes plants to die, and with them goes the fauna as well.

Sand dunes designated for O.R.V. use should have no vegetation upon them. Access to these dunes should be strictly limited to

one or two well-marked roads which avoid vegetated areas, especially washes. Vegetated dunes should receive high priority for protection against adverse impact. The flora and fauna have evolved and specialized over thousands of years to survive the stringent desert dune environment, but cannot withstand the sudden drastic changes man now threatens to impose.

The Gila Monster in California

The Gila monster (Heloderma suspectum) represents one of the most unique potential additions to the herpetofauna of the eastern Mojave Desert of California. This and the closely related Mexican beaded lizard are the only poisonous lizards in the World. Both are large spectacular reptiles, the Gila monster being the largest lizard native to the United States.

Gila monsters are found from extreme southwestern Utah and southern Nevada east of Las Vegas down into southern Arizona, southwest New Mexico, and Sonora, Mexico. Records indicate that they become much commoner in the southern portions of their range. The banded Gila monster (Heloderma suspectum cinctum), described by Bogert and Martin del Campo in 1956, was not shown by them to range into California at any point. However these authors did admit the possibility that it might eventually be found in California along the Colorado River in the eastward-extending Whipple and Chemehuevi Mountains.

Since that time several specimens have turned up in California. This now throws open the question of just where the western boundary of the Gila monster's range actually lies. Funk (1966) records a specimen of the reticulate Gila monster (H. s. suspectum), a southern Arizona subspecies, on the California side of Imperial Dam in Imperial County. Bradley and Deacon (1966) cite a specimen of H. s. cinctum in the University of Nevada collection from the eastern slope of Clark Mountain, San Bernardino County, California. Stebbins (1966) includes Clark Mountain within the range of cinctum. Mr. Harvey Fisher, Curator of Reptiles at the Los Angeles Zoo, has a specimen of cinctum taken on the Vulcan Mine Road about 3 miles south of Kelso (T-10N, R-13E, S-17) on April 16, 1968 (pers. comm.). Here at 2300 feet on a rocky bajada the vegetation consists of creosote bush (Larrea), bur sage (Ambrosia), a few scattered Mojave yuccas (Yucca), and some catclaw bushes (Acacia). This spot lies some 46 miles south of Clark Mountain and about 55 miles west of the Colorado River. If this single record is a good one, it either represents a considerable

range extension or a heretofore undiscovered disjunct population on the west slope of the Providence Mountains.

Another specimen reported in June 1975 from the OX Ranch at 4349 feet in the Lanfair Valley (T-13N, R-16E, S-18) turned out to have been brought in from Arizona by one of the ranch hands. This fact was confirmed by Mr. Pete Featherstone, foreman of the OX Ranch. This specimen was donated in very poor condition to the University of California at Berkely and skeletonized before the subspecies was determined. Unfortunately subspecific characters all relate to the pattern of markings and cannot be ascertained from skeletal material.

In their 1966 paper Bradley and Deacon have cited locations for nine specimens of the banded Gila monster at the northwest extreme of its range. In August 1975 Mr. Ed Wessmann of the BLM and I conducted a survey of the eastern Mojave Desert in California and extreme southern Nevada. This survey focused on determining whether there were any apparent topographic, climatic, or biological differences between areas where Gila monsters are known to occur and those just outside the known range. A number of inquiries were made at towns, mines, ranches, and homesteads throughout the region. Certain precautions were necessary in making these inquiries. First, greater weight was given to the statements of long-time permanent residents, since Gila monsters are infrequent this far north even within their known range. Second, the reliability of individuals was subjectively evaluated by the general trend of their conversation. Third, it was necessary to find out whether they could properly distinguish a Gila monster from a chuckwalla. Chuckwallas are large rock-dwelling lizards, second only to Gila monsters in size, and are often marked with tail bands and various color combinations of black, tan, and rust-red. Chuckwallas are common throughout this area and are often killed for Gila monsters by people who do not know them.

The results of these inquiries at 12 localities in California between Clark Mountain to the north and Sacramento Spring near the Dead Mountains to the

south were essentially all negative. The exception, Mr. Robert Ausmus of Cima, thought he recalled having seen one in the area as a boy about 40 years ago, but he could not be certain. Interestingly, inquiries at Molycorp, a large mining company at Clark Mountain, also yielded negative results. Neither Mr. James Cole, General Manager, nor Mr. Jack Meyers, in charge of operations, had ever heard of any Gila monsters there. As mentioned before, Clark Mountain is the source of an existing museum specimen at the University of Nevada. However along the Colorado River from Nelson, Nevada northward, various persons reported having seen Gila monsters from time to time.

On July 25, 1975 Dr. Mark Dimmitt of the BLM and I visited Paiute Springs- a lush riparian woodland of cottonwoods (Populus), mesquite (Prosopis), seep-willow (Baccharis), and willow (Salix) extending for about 3 miles along a stream of running water. This lies at 3000 feet (T-12N, R-18E, S-24) on the eastern slope of the Paiute Mountains. Except for this riparian habitat, the Paiutes are dry and barren. Dr. Kristin Berry of the BLM had been told of several Gila monsters having been killed in a rock crevice at Paiute Springs a year or so before by a local miner. Although Paiute Springs is 30 miles west of the Colorado River, it lies within that watershed. The presence of permanent water and dense vegetation here makes the likelihood of a relict Gila monster population seem possible. An on-foot reconnaissance of the area yielded no Gila monsters, but a vividly banded young chuckwalla was seen feeding on the flowers of a sweetbush (Bebbia) growing along the stream embankment. Nevertheless I do not feel that this brief reconnaissance was at all conclusive, and that more work must be done here before any positive statement about Gila monsters at Paiute Springs can be made.

The question then arises as to what factors might limit the westward range of the Gila monster. Climatically, the annual occurrence of summer rain seems to play a significant role. A bit to the south, the Colorado River fairly well delineates the boundary between the summer-drought California desert and the summer-rain

Arizona desert. The rather abrupt appearance of sahuaro cactus (Cereus) and little-leaf palo verde (Cercidium microphyllum) on the Arizona side gives the vegetation there a look of lushness not evident in California. In this region the Gila monster ranges up to the Colorado River but not west of it. Therefore the western range of the Gila monster seems to coincide fairly well with the western limits of annual summer rainstorms (Bogert and Martin del Campo, 1956).

By contrast the barren volcanic hills south and east of Las Vegas, Nevada show no abrupt changes in vegetation and appear little different from those in nearby California. Here river drainage patterns are apparently the critical factor. As pointed out by Bradley and Deacon (1966), virtually all of the confirmed Gila monster records in southern Nevada and Utah come from the drainage system of the Colorado River or its tributaries - Las Vegas Wash, the Moapa River, Meadow Valley Wash, and the Virgin River. North of the Paiute Range, San Bernardino County, California lies entirely outside of this drainage system.

There are several other considerations. Southern California has more herpetologists working in the field than any other part of the country. Despite its size there are probably few herpetological surprises left here. Nowadays newly-discovered forms and range extensions mainly involve small secretive species which are easily overlooked. The Gila monster is a large, gaudy, and conspicuous lizard. Within its established range it is well-known to most people and not easily forgotten once seen. Finally there are many people these days who keep reptiles as pets and others who deal commercially in them. Often exotic pets are released in strange places by those who tire of them or wish to see a favorite animal become "established" in their home state. Most of these unfortunate captives are released along some desert road to wander about and eventually die in an unsuitable habitat. However it is also along such roads that other collectors are most likely to recapture these waifs thereby adding to the confusion with "new records."

It is well-known that the climate of the Mojave Desert region 5000 to

10000 years ago was cooler and wetter than it is today (Antevs, 1952). Therefore it cannot be dismissed that small relict Gila monster populations may still exist as isolated remnants of a formerly more extensive westward distribution. The presence of several specimens rather than just one from any given location in California would lend considerable strength to this hypothesis.

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